

# Sounds Lab

You are going to do some in-class experiments to learn about sound as a form of energy and how that energy travels. You will conduct ten activities to see how sound travels through different objects and mediums and record your observations. First, answer the thought questions. Second, complete the experiments and record your observations. Third, answer the final questions.

## Thought Questions

1. What is sound?
2. How are sounds made?
3. How does sound travel?
4. Does sound travel the same through gases, liquids, and solids?

## Materials

Various at different stations.

**First do this:** Make a chart showing the cause of vibration and the medium(s) for the vibrations at each station as you go along.

### Station #1

Touch the side of your throat and hum softly.

1. What do you feel as you hum?
2. What do you hear?
3. How can you create different pitches?

### Station #2

Hold one end of the ruler flat and firmly against the table top and gently pluck the other end of the ruler. Be careful not to snap the ruler in half.

1. What do you see?
2. What do you hear?
3. How can you create different pitches?

### Station #3

Wrap the rubber band around the plastic cup so that it crosses the opening of the cup. Holding the sides of the cup, pluck the rubber band over the opening.

1. What do you feel?
2. What do you hear?
3. How can you create different pitches?

### Station #4

Place the paper clips on the plastic lid of the coffee can. Gently strike the lid with the eraser end of a pencil.

1. What do you see?
2. What do you hear?
3. How can you create different pitches?

### Station #5 - Do not tap the tuning fork on any hard surface.

Tap the tuning fork on the green anvil and place the tip of the fork in the water. Clean up any spilled water.

1. What do you see?

Tap the tuning fork on the green anvil and hold the fork up to your ear.

2. What do you hear?

Tap the tuning fork on the green anvil and hold the fork up to your ear. Slowly rotate the tuning fork.

3. What do you hear?

**Station #6 - Do not tap the tuning fork on any hard surface.**

Tap the tuning fork on the green anvil and place base of the fork's handle firmly against (a) the table, (b) the box, (c) the bottom of the cup, and (d) your forehead. You will need to re-tap the fork each time.

1. Describe what you hear each time.
2. Which makes the sound seem loudest?

**Station #7**

Using the string and cup phone, pull the string tight between you and your partner. Take turns whispering and listening through the cuphone.

1. Describe what you hear when your partner talks.
2. Describe what you feel.

**Station #8**

Tap your fingernail against the table.

1. Compare what you hear when your head is up to what you hear when you lay your ear against the table.

**Station #9**

Hold the loose piece of string with your left hand and let it hang down. Squeeze the string with your right thumb and forefinger and slide them down the string. Try pulling in short jerking motions.

1. What do you feel? What do you hear?

Hold the cup with your left hand so that the opening is down and the string hangs down from the cup. Squeeze the floss with your right thumb and forefinger and slide them down the floss. Try pulling in short jerking motions.

2. What do you feel? What do you hear?

**Station #10**

Tap the side of each bottle with the edge of the metal strip and then blow across the top of each bottle.

1. Compare the pitches you hear while tapping each bottle versus blowing across each bottle.

**Using your observations from the sound stations, answer the following questions:**

1. How were you able to change the pitch of the sound at Stations #1 - 4?
2. At Station #2 you plucked the end of a ruler. Describe what happened to the air around the ruler after it was snapped?
3. At Station #4, how are the paper clips similar to the air that is close to the lid?
4. At Station #5 you placed a vibrating tuning fork in water. Describe how your observation of waves or ripples in the water model the sound waves you heard from the tuning fork when you held it near your ear at Station #6? How are the water ripples different than the sound waves you heard?
5. At Station #5 you rotated the tuning fork near your ear. What caused the sound to get louder and softer?
6. At Station #7 you used a string and cup phone to transmit sound. How does this demonstrate sound traveling through a solid? What do you think would happen if you pinched the string between the two cups?
7. At Station #8, you tapped on the table and listened with your head up and with your ear on the table. Did the sound seem travel better through solid material or gas? Why do you think this is true?
8. At Stations #6 and 9: describe the cause of the increase in volume of the sound you heard?
9. Station #10: why did the higher pitch switch bottles when you blew across the top vs. tapping?
10. Make any corrections to the Thought Questions from the beginning of the lab.

Station	Source of vibrations	Medium(s)
1	Vocal cords	Air, throat, fingers, head,...

Materials at Each Station

Station 2 - wood ruler

Station 3 - plastic cup, rubber band

Station 4 - Empty coffee can with plastic lid, 3-5 paperclips

Station 5 - tuning fork, tray of water, green anvil, paper towels

Station 6 - tuning fork, box, plastic cup

Station 7 - string/cup phone (two cups with string tied between)

Station 9 - cup with string tied through, piece of string

Station 10 - 2 glass bottles (Bottle A one-third full of water, Bottle B empty), two metal strips